CLAIMS

1. A refrigerator having a freezing cycle, wherein:

a high-pressure side discharge port of a two-stage compressor and a condenser are connected;

said condenser and flow rate variable means of a cross valve type are connected;

a refrigerating side exit of said flow rate variable means is connected to a medium pressure side suction port of said two-stage compressor via a refrigerating capillary tube and an evaporator for a refrigerating chamber;

a freezing side exit of said flow rate variable means is connected to an evaporator for a freezing chamber via a freezing capillary tube; and

said evaporator for said freezing chamber is connected to a low-pressure side suction port of said two-stage compressor via a low-pressure suction pipe;

characterized in that said refrigerator further comprises control means, which:

switches a simultaneous cooling mode for simultaneously supplying a refrigerant to said evaporator for said refrigerating chamber and said evaporator for said freezing chamber and a freezing mode for supplying said refrigerant only to said evaporator for said freezing chamber to each other by said flow rate variable means; and

during said simultaneous cooling mode, adjusts a refrigerant flow rate in a direction of easy flow of said refrigerant in either of said refrigerating capillary tube and said freezing capillary tube by said flow rate variable means, and thereby performs a temperature difference control so as to make a difference between an entrance temperature of said evaporator in said direction of easy flow of said refrigerant and an exit temperature thereof equal to a preset temperature difference.

2. A refrigerator having a freezing cycle, wherein:

a high-pressure side discharge port of a two-stage compressor and a condenser are connected;

said condenser and flow rate variable means of a cross valve type are connected;

a refrigerating side exit of said flow rate variable means is connected to a medium pressure side suction port of said two-stage compressor via a refrigerating capillary tube and an evaporator for a refrigerating chamber;

a freezing side exit of said flow rate variable means is connected to an evaporator for a freezing chamber via a freezing capillary tube; and

said evaporator for said freezing chamber is connected to a low-pressure side suction port of said two-stage compressor via a low-pressure suction pipe;

characterized in that said refrigerator further

comprises control means, which:

switches a simultaneous cooling mode for simultaneously supplying a refrigerant to said evaporator for said refrigerating chamber and said evaporator for said freezing chamber and a freezing mode for supplying said refrigerant only to said evaporator for said freezing chamber to each other by said flow rate variable means; and

during said simultaneous cooling mode, adjusts a refrigerant flow rate in a direction of easy flow of said refrigerant in either of said refrigerating capillary tube and said freezing capillary tube by a number of revolutions of a fan in the neighborhood of said evaporator installed in said direction of easy flow of said refrigerant, and thereby performs a temperature difference control so as to make a difference between an entrance temperature of said evaporator in said direction of easy flow of said refrigerant and an exit temperature thereof equal to a preset temperature difference.

3. A refrigerator having a freezing cycle, wherein:

a high-pressure side discharge port of a two-stage compressor and a condenser are connected;

said condenser and flow rate variable means of a cross valve type are connected;

a refrigerating side exit of said flow rate variable

means is connected to a medium pressure side suction port of said two-stage compressor via a refrigerating capillary tube and an evaporator for a refrigerating chamber;

a freezing side exit of said flow rate variable means is connected to an evaporator for a freezing chamber via a freezing capillary tube; and

said evaporator for said freezing chamber is connected to a low-pressure side suction port of said two-stage compressor via a low-pressure suction pipe;

characterized in that said refrigerator further comprises control means, which:

switches a simultaneous cooling mode for simultaneously supplying a refrigerant to said evaporator for said refrigerating chamber and said evaporator for said freezing chamber and a freezing mode for supplying said refrigerant only to said evaporator for said freezing chamber to each other by said flow rate variable means; and

during said simultaneous cooling mode, adjusts a refrigerant flow rate in a direction of easy flow of said refrigerant in either of said refrigerating capillary tube and said freezing capillary tube by said flow rate variable means or by a number of revolutions of a fan in the neighborhood of said evaporator installed in said direction of easy flow of said refrigerant, and thereby performs a temperature difference control so as to make a

difference between an entrance temperature of said evaporator in said direction of easy flow of said refrigerant and an exit temperature thereof equal to a preset temperature difference.

4. The refrigerator according to at least one of Claims 1 to 3, wherein:

said refrigerant flows in said refrigerating capillary tube easier than said freezing capillary tube.

5. The refrigerator according to at least one of Claims 1 to 3, further comprising:

an accumulator installed on a downstream side of said evaporator in a direction of hard flow of said refrigerant in either of said refrigerating capillary tube and said freezing capillary tube.

6. The refrigerator according to at least one of Claims 1 to 3, further comprising:

temperature sensors installed respectively at an entrance and an exit of said evaporator in said direction of easy flow of said refrigerant; and

wherein said control means measures said entrance temperature and said exit temperature using said both temperature sensors.

7. The refrigerator according to at least one of Claims 1 to 3, wherein:

said control means, in said freezing mode, adjusts a capacity of said two-stage compressor, and thereby controls said temperature of said evaporator for said freezing chamber.

8. The refrigerator according to at least one of Claims 1 to 3, wherein:

said control means performs said temperature difference control a fixed period of time after starting said simultaneous cooling mode.

9. The refrigerator according to at least one of Claims 1 to 3, wherein:

said control means, at a start time of said temperature difference control, opens fully said refrigerating side exit of said flow rate adjustment means and at an end time of said simultaneous cooling mode, closes it fully.

10. The refrigerator according to Claim 2, wherein:

said control means rotates said fan at a low speed when a difference between said entrance temperature and said exit temperature is higher than a predetermined temperature difference and at a high speed when said

difference is lower than said predetermined temperature difference.

11. The refrigerator according to Claim 3, wherein:

said control means adjusts said number of revolutions of said fan together with said flow rate adjustment by said flow rate adjustment means.

12. The refrigerator according to Claim 3, wherein:

said control means, when a flow rate of said refrigerant at said exit of said flow rate adjustment means in said direction of easy flow of said refrigerant is lower than a predetermined flow rate, makes said number of revolutions of said fan larger than a predetermined number of revolutions.

13. The refrigerator according to Claim 3, wherein:

said control means, when a flow rate of said refrigerant at said exit of said flow rate adjustment means in said direction of easy flow of said refrigerant is higher than a predetermined flow rate, makes said number of revolutions of said fan smaller than a predetermined number of revolutions.

14. The refrigerator according to Claim 3, wherein:

said control means, when a difference between said

entrance temperature and said exit temperature is higher than a predetermined temperature difference, adjusts said flow rate by said flow rate variable means, and when said temperature difference is lower than said predetermined temperature difference, adjusts said flow rate by said fan, and thereby performs said temperature difference control.

15. A refrigerator, comprising:

a condenser for liquefying a gas refrigerant discharged from a compressor;

refrigerant flow rate adjustment means with two valve openings for discharging said refrigerant flowing in from said condenser and for adjusting refrigerant flow rates flowing out through said valve openings as flow ratios to said refrigerant flow rates when said valve openings are opened fully according to an opening of a valve body;

a freezing evaporator and a refrigerating evaporator in which said refrigerants flowing out from said valve openings of said refrigerant flow rate adjustment means flow, respectively;

temperature sensors for detecting an entrance temperature and an exit temperature of one evaporator; and

control means for executing a freezing cycle operation on the basis of cooled conditions of a freezing section and a refrigerating section cooled by said freezing evaporator and said refrigerating evaporator,

respectively;

wherein said control means controls said refrigerant flow rate adjustment means to limit and adjust said refrigerant flow rate to at least one evaporator so as to make a superheat amount which is a difference between said exit temperature and said entrance temperature of said one evaporator detected by said temperature sensors equal to a target superheat amount, when a predetermined condition for regarding said entrance temperature and said exit temperature of said one evaporator as the same is held, calibrates said detected temperatures by said temperature sensors so as to be the same, and then returns to an ordinary control.

16. The refrigerator according to Claim 15, wherein:

said control means, when a power source is turned on, judges that said predetermined condition is held.

17. A refrigerator, comprising:

a condenser for liquefying a gas refrigerant discharged from a compressor;

refrigerant flow rate adjustment means with two valve openings for discharging said refrigerant flowing in from said condenser and for adjusting refrigerant flow rates flowing out through said valve openings as flow ratios to full openings;

a freezing evaporator and a refrigerating evaporator in which said refrigerants flowing out from said valve openings of said refrigerant flow rate adjustment means flow, respectively;

a temperature sensor for detecting an exit temperature of one evaporator; and

control means for executing a freezing cycle operation on the basis of cooled conditions of a freezing section and a refrigerating section cooled by said freezing evaporator and said refrigerating evaporator, and for executing a defrosting operation on the basis of said a temperature detected by said temperature sensor, respectively;

wherein said control means controls said refrigerant flow rate adjustment means to limit and adjust said refrigerant flow rate to at least one evaporator, and when a state continues that said temperature detected by said temperature sensor is constant during said defrosting operation for said one evaporator calibrates said detected temperature to be zero.

18. A refrigerator, comprising:

a condenser for liquefying a gas refrigerant discharged from a compressor;

refrigerant flow rate adjustment means with two valve openings for discharging said refrigerant flowing in from

said condenser and for adjusting refrigerant flow rates flowing out through said valve openings as flow ratios to said refrigerant flow rates when said valve openings are opened fully according to an opening of a valve body;

a freezing evaporator and a refrigerating evaporator in which said refrigerants flowing out from said valve openings of said refrigerant flow rate adjustment means flow, respectively; and

control means for executing a freezing cycle operation on the basis of cooled conditions of a freezing section and a refrigerating section cooled by said freezing evaporator and said refrigerating evaporator, respectively;

wherein said control means controls said refrigerant flow rate adjustment means to limit and adjust said refrigerant flow rate to at least one evaporator, and when a predetermined condition for regarding that a stop state of a refrigerant supply to said one evaporator occurs is held, controls said refrigerant flow ratio to said one evaporator to a predetermined return value.

19. The refrigerator according to Claim 18, wherein:

said control means, when controlling said refrigerant flow rate adjustment means such that said valve opening to said one evaporator is closed fully or is put into a minimum opening state, judges that said predetermined

condition is held.

20. The refrigerator according to Claim 18, further comprising:

a temperature sensor for detecting an exit temperature of said one evaporator; and

wherein said control means, when a rise rate of said temperature detected by said temperature sensor is higher than a predetermined value, judges that said predetermined condition is held.

21. The refrigerator according to Claim 18, further comprising:

temperature sensors for detecting an entrance temperature and an exit temperature of said one evaporator; and

wherein said control means, when a difference between said exit temperature and said entrance temperature of said one evaporator detected by said temperature sensors is lower than a predetermined value and a difference between said entrance temperature of said one evaporator and a temperature of a section to be cooled of said one evaporator is lower than a predetermined value, judges that said predetermined condition is held.

22. The refrigerator according to any of Claims 18 to

21, wherein:

said control means, in a state that said control means judges that said predetermined condition is held and controls said refrigerant flow ratio to said one evaporator to said return value, controls said refrigerant flow rate adjustment means to set a next return value so as to be small when judging that said refrigerant flow rate to said one evaporator is insufficient and to set said next return value so as to be large when judging that said refrigerant flow rate is excessive.

23. The refrigerator according to Claim 22, wherein:

said control means, when a number of revolutions of said compressor is large, changes said return value high.

24. The refrigerator according to Claim 23, wherein:

said control means, when an air temperature is low, does not change said return value.